1456054 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

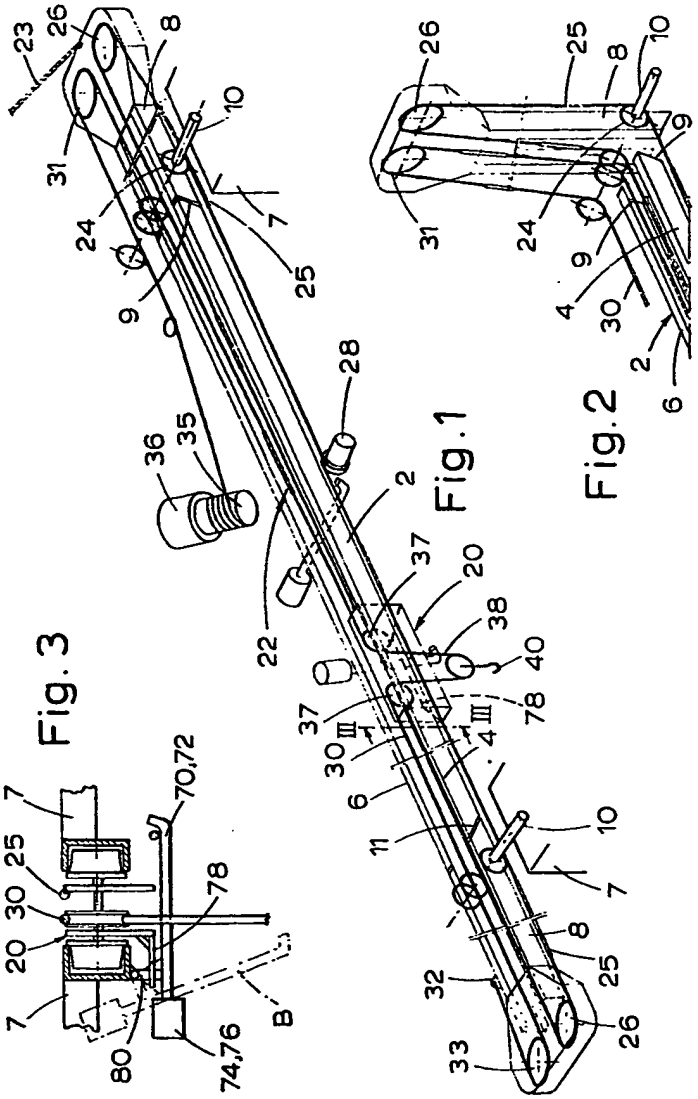

Fig. 1

Fig. 2

Fig. 3

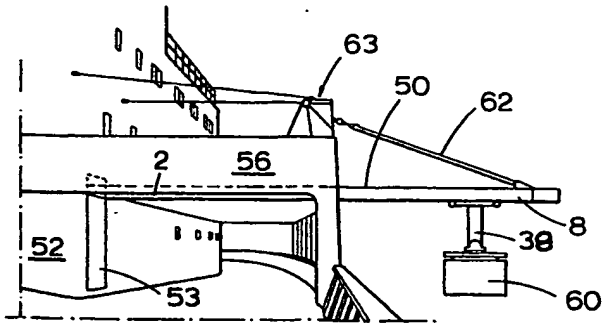

Fig.4

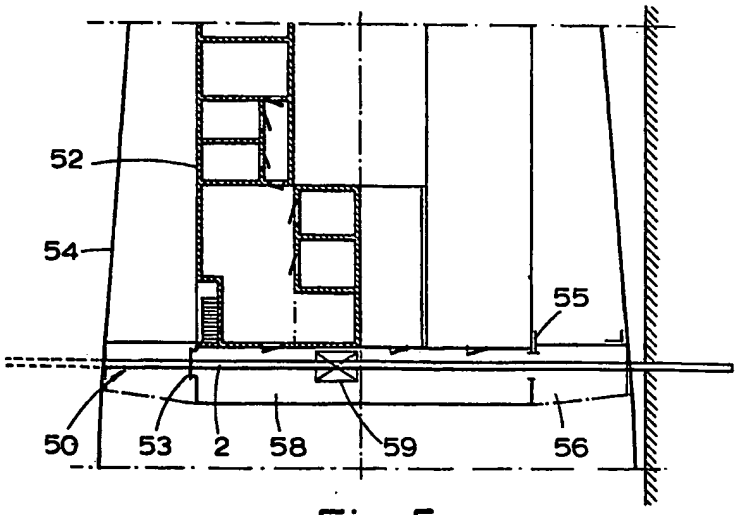

Fig.5

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PATENT SPECIFICATION (11) 1 456 054

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(19)

(54) A CRANE FOR SHIPS

(71) We, A/S FREDRIKSSTAD MEK. VERKSTED, a Norwegian company of 1600 Fredrikstad, Norway, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to a crane for a sea-going ship of any kind.

There are known several types of so-called gantry cranes wherein the crane beam or beams supporting a carriage are provided with a cantilevered beam or beams extended beyond the supporting posts on the ship. There are also known various types of gantry cranes wherein the horizontally extending carrier beam can be retracted from a cantilevered position, and furthermore are known cantilevered crane beams which are pivotally connected to the carrier beam mounted on the ship.

Although effective in use such crane constructions present several well known disadvantages. Thus the crane structures are heavy, space consuming and quite expensive. A special problem arises frequently in connection with the total height of the crane structure, impeding the stability of the ship. Furthermore, such cranes to a large extent are exposed to the weather which naturally leads to corrosion and risks for incidental malfunctions, due to failing bearings, cables and/or control equipment, etc.

We have now devised a crane which can be built as a relatively light construction, and is correspondingly simple to instal and takes up comparatively little space, when installed, on the ship. This crane includes two cantilever beams, pivoted to opposite ends of a main beam, which can, in a simple and quick manner, be pivoted to a position flush with the ship side, without impeding the operation of the crane. The crane can be made for installation on a normal accommodation deck height and therefore can be installed, partly internally, in or in connection with the forward wall of a ship casing, superstructure or other erection. The operating equipment for the crane, such as the load carriage movable along the beams, and the controls, can be mounted and positioned in protected situation within an enclosure on the ship.

This invention provides a crane for installation on a ship, said crane comprising a main beam for fixed mounting on a ship so as to extend horizontally, transversely of the ship, a cantilever beam pivoted to each end of the main beam, each cantilever beam being movable about its pivot between a position aligned with and forming an extension of the main beam and a position in which it is directed upwardly, when the crane is installed on a ship, a load carriage for travelling along the beams, and a system of hauling wires for pulling the carriage along the beams, said system including lengths of wire which extend along the beams and are trained around pulleys at the outer ends of each cantilever beam and which are also trained around guiding means adjacent the pivotal axes of the cantilever beams. The crane can operate with one or other or both cantilever beams in operative position.

An embodiment of crane to be described herein possesses also other important advantages. One advantage is a deck-space saving positioning of the crane and the fact that it is possible to use the crane with either or both cantilever beams lowered, for handling goods from either side of the ship and bringing the goods directly down to any desired level within the ship, through doors or access openings in the ship superstructure walls below the crane beam, thus making it unnecessary to use the usual hatches in the deck or similar. Of other advantages shall be mentioned the simplicity of the construction and maintainance, and furthermore the safety measure that no hatches are required, only door openings, which inherently are safer.

An embodiment for a transverse crane in accordance with the invention shall in the following be further described, by way of

example only, in connection with the accompanying drawings, wherein:

Figure 1 is a schematical perspective view of the assembled crane, both cantilever beams being in operative position.

Figure 2 is a detail perspective view similar to Figure 1, and showing one of the cantilever beams in its swung-up position.

Figure 3 is a detail sectional view shown in an enlarged scale taken along line III—III of Figure 1.

Figures 4 and 5 are showing fragmentary views perspectively showing parts of a ship with a superstructure and illustrating the installation of a transverse crane in accordance with the invention.

In Figures 1, 2 and 3 the reference number 2 designates a crane main beam which in the shown embodiment comprises two parallel U-beam sections 4 and 6, which are installed and supported by an adjacent supporting structure in the casing and which in the Figures for sake of clarity only are indicated in the shape of two supporting parts 7, 7. At each end 9, 11 of the fixed beam sections 4, 6, respectively, are provided cantilever beams 8, 8, which are pivotally journalled on horizontal pivot shafts 10, 10 which are supported in the superstructure 7, 7, respectively. The cantilever beams 8, 8 are arranged to be pivotable upwards from the horizontally extended position shown in Figure 1 to a vertical inoperative position as shown in Figure 2. The abutting meeting ends of the carrier beam 2 and the cantilever beams 8, 8, are made complementary to each other, preferably undercut as illustrated in order to provide a steady and firm base for the cantilever beams when these are lowered down to operative horizontal position. It should be understood that Figures 1 and 2 only are meant to illustrate the principle of the crane construction. In a practical embodiment the pivoted cantilevered beams would preferably be arranged with further biasing and locking means. Each of the cantilever beams 8 is suspended by a suspension wire 23 (only one shown) which at a higher level on the superstructure is connected to a motor means such as a hydraulic winch or the like. A suspension wire and winch are shown at 62 and 63 in Figure 4.

The important measure is, however, that when one or both cantilever beams 8, 8 are positioned in the horizontal or cantilevered position, these together with the crane beam 2 will provide a continuous support for a load carriage 20.

The carriage 20 is provided with rollers 21, for instance four pairs of rollers. The carriage is driven by means of a wire hauling system 22 having a hauling wire 25 running underneath pulleys 24, 24 at each end of the beam 2 which pulleys 24, 24 are preferably journalled somewhat excentrically relative to the pivots 10, 10 for the cantilever beams 8, 8 such as schematically illustrated in Figures 1 and 2, in order to minimise variations in wire tension as the cantilever beams pivot. For sake of clarity the wires are partly shown as one thick line, partly as a double-lined wire. The wire 25 extends further out to turning pulleys 26, 26 supported at the outer ends of the cantilever beams 8, 8, respectively. The respective ends of the hauling wire 25 are in conventional manner anchored on to the carriage 20. Thereby the carriage 20 can, independently of the angular position of one or both cantilever beams 8, 8 travel on the fixed crane beam 2 by means of a motor 28 which can be installed at a suitable position below the beam 2 inside the ship superstructure or casing. In the operational position of the crane as illustrated in Figure 1, the carriage 20 can furthermore be directly driven out to the outer end of each of the cantilever beams 8, 8. When one or both cantilever beams 8 are positioned in swung up inoperative position as illustrated in Figure 2, the carriage would at arrival thereto bump against the cantilever beam 8 and thereby be brought to a halt.

The carriage 20 is furthermore provided with a hoisting wire 30, the one end of which is anchored to one of the cantilever beams 8 at an anchor point 32, and is trained around a running pulley 33 at the outer end of this beam. The other end section of the hoisting wire 30 is likewise on the other cantilever beam, trained around a running pulley 31 and from here to a winch drum 35 including a winch motor 36. From the carriage 20 the hoisting wire 30 is via suitable pulleys 36 arranged with a wire sling 38 and in conventional manner provided with a hook means 40. At the fixing point 32 for the hoisting wire 30 is preferably provided a further running wheel, from which the wire 30 can be extended to an auxiliary hoisting drum, serving as an emergency hoisting means to be used if the motor 36 should fail. (These parts not shown).

In replacement of the preferred hoisting wire system 30 including a stationary mounted winch motor/drum 35, 36 (inside the superstructure) could be visualized embodiments wherein the carriage is itself provided with suitable electrically or hydraulically driven motor means for the hoisting wire 30.

It will be appreciated that the various wire runs in the hauling and hoisting wire systems will—if not exceedingly tensioned—have a tendency to hang down and form slacks along the runs between the

respective pulleys on the carrier and on the crane beams and the cantilevered beams, respectively. Such wire slacks are not only inconvenient, but may cause incidental derailing or jump off of a wire. To overcome this problem the wires are, as best shown in Figure 3, along their run intermittently supported by weight-biased pivotal arms 70, 72 having counterweights 74, 76 sufficient to keep the arms horizontal, as shown, in order to support the wires 25, 30. A cam plate 78 mounted on the carriage 20 will during its travel hit arm brackets 80 and pivot the arms to an aside position, as shown by chain-dotted lines "B" in Figure 3 making free way for the carriage and the hoisting wire loop 38. When the carriage has passed the bracket 80 on an arm 70, the same will drop down again and once more support the wires, whereby said slack or downhanging is avoided. In order to avoid noise the cam plate 78 and the adjacent part of the arms 70, 72 can be rubber clad.

Figures 4 and 5 illustrate schematically the crane installed in a manner aboard a sea-going ship, having a superstructure 56.

The transverse crane 50 is herein shown mounted below the ceiling or roofing at the fore edge of the deck casing 52, such that the crane main beam 2 extends out to the side of the hull below the casing deck. In the casing 52 the beam 2 extends through a transverse crane shaft or passage 58 which suitably is provided with doors 53 at both sides of the casing 52. From the crane shaft 58 extends downwardly, preferably at the centre of the ship a vertical shaft 59 providing direct access to the various levels in the ship. The crane motor 35, 36 and the hauling wire motor 28 are suitably mounted some place along the crane passage 58 easily accessible. The crane is furthermore furnished with complete control means with switches etc. on both sides of the ship, making it possible for an operator to operate the crane from either side of the ship. Figure 4 illustrates the crane in operation. The cantilever beam 8 is here swung down to horizontal operating position, and is supported by a hoisting cable 62, at the upper end connected to a winch disposed in a housing. A piece of goods 60 is supported by the hoisting wire 30 and can from the shown position be driven onto the ship through the access door 53 to the center of the casing 52 and down through the hatch 59 to desired deck level within the ship.

Usually only one of the cantilever beams 8 will be used at a time. It will, however, be understood that the crane can be utilized with both cantilever beams in operation, for instance for handling cargo to/from both sides of the ship or from one side to the other. Furthermore, the crane can be used for internal handling of goods as an elevator crane between various deck levels in the ship.

A substantial advantage in the construction rests in that the crane requires litte space and forms no or little obstruction. Conventional cranes usually form obstructions for the traffic and otherwise aboard the ship, and furthermore require special hatches etc. for providing access to the inside of the ship. Otherwise is the advantage that no adjustments are necessary for using one or the other of the cantilever beams, and that the motors etc. for the crane are mounted on the inside of the casing and thus are protected against the weather.

WHAT WE CLAIM IS:—

1. A crane for installation on a ship, said crane comprising a main beam for fixed mounting on a ship so as to extend horizontally, transversely of the ship, a cantilever beam pivoted to each end of the main beam, each cantilever beam being movable about its pivot between a position aligned with and forming an extension of the main beam and a position in which it is directed upwardly, when the crane is installed on a ship, a load carriage for travelling along the beams, and a system of hauling wires for pulling the carriage along the beams, said system including lengths of wire which extend along the beams and are trained around pulleys at the outer ends of each cantilever beam and which are also trained around guiding means adajcent the pivotal axes of the cantilever beams.

2. A crane in accordance with claim 1, comprising a system of wires for lifting a load when suspended from said carriage, said load-lifting system of wires including lengths of wire which extend along the beams and are trained around further pulleys at the outer ends of each cantilever beam and which are also trained around further guiding means adjacent the pivotal axes of the cantilever beams.

3. A crane in accordance with claim 1 or 2, comprising arms spaced along the beams to support the wires, said arms being pivoted and biassed by weights to positions in which they support the wires but each being movable by a cam provided on the carrier to a position allowing travel of the carriage past that arm.

4. A crane in accordance with any of the preceding claims, comprising a winch for raising the cantilever beams.

5. A crane in accordance with any of the preceding claims, in which each said guiding means comprising a pulley having its pivotal axis disposed excentrically relative to the pivotal axis of the respective

cantilever beam so as to minimise variations in the wire tension with varying angular position of that cantilevered beam.

6. A crane substantially as herein described with reference to the accompanying drawings.

7. A crane in accordance with any of the preceding claims, when installed on a ship with the main beam extending through a superstructure of the ship and having the same length as the width of the ship, said superstructure having openings, at opposite sides of the ship, through which the main beam extends.

8. An installed crane in accordance with claim 7, wherein the ship is provided below the main beam and within the superstructure, with a vertical crane shaft with access to various deck levels in the ship, enabling the crane to transfer goods from the outside of the ship directly into the ship superstructure and from there directly downwards to any of said deck levels in the ship.

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